

**Application No.: 10/510,401**  
**Filing Date: May 12, 2005**

## **REMARKS**

Claim 1 has been amended. New claims 33 and 34 have been added. Thus, claims 1, 3-10, 13-18 and 23-34 are pending in the present application. Support for the amendment to claim 1 may be found in the specification (PCT publication) at page 13, lines 27-29. Thus, no new matter has been added. Reconsideration and withdrawal of the present rejections in view of the amendments and comments presented herein are respectfully requested.

### Rejection under 35 U.S.C. § 112, first paragraph

Claims 1, 3-9, 23-24, 26-27 and 32 were rejected under 35 U.S.C. § 112., first paragraph, as allegedly not complying with the written description requirement . In particular, the Examiner contends that recitation of “and has substantially no effect on dough rheology” is not supported by the specification. The specification (PCT publication) at page 13, lines 27-29 states that the protease “had no perceivable action on the dough rheology...” Although Applicants submit that this term is clearly equivalent to “substantially no effect on dough rheology”, claim 1 has been amended to recite the language from the specification in order to expedite prosecution of the application.

In view of the comments presented above, Applicants respectfully request reconsideration and withdrawal of the rejection under 35 U.S.C. § 112, first paragraph.

### Rejection under 35 U.S.C. § 112, second paragraph

Claims 1, 3-9, 23-24, 26-27 and 32 were rejected under 35 U.S.C. § 112, second paragraph as allegedly being indefinite based on recitation of “substantially” and “no effect on dough rheology.” Claim 1 as amended no longer recites “substantially”, thus rendering this part of the rejection moot. The metes and bounds of “no effect on dough rheology” would be clearly understood by one of ordinary skill in the baking industry. Enclosed herewith is an article by Mirsaeedghazi et al. (Int. J. Agric. Biol. 10:1, 112-119, 2008) which defines rheology as “the science of the deformation and flow of matter. It is the study of the manner in which materials respond to applied stress or strain.” (page 112, introduction), and relates to the viscoelasticity of the dough (see abstract). Rheology is measured using a farinograph, mixograph, etc. (abstract). Thus, recitation of “no perceivable action on dough rheology” means that no perceivable

**Application No.: 10/510,401**  
**Filing Date: May 12, 2005**

differences would be measured in the dough when using a thermostable serine protease as presently claimed. Thus, this is a fully definite term, and would be well understood by one of ordinary skill in the art.

In view of the comments presented above, Applicants respectfully request reconsideration and withdrawal of the rejection under 35 U.S.C. § 112, second paragraph.

**Rejections under 35 U.S.C. § 103(a)**

Claims 1, 3, 4, 6, 8-10, 13-15, 17, 18, 25, 27, and 30-32 were rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Klingenberg et al. (DD 156,714 A, “R1”) in view of Oleson et al. (US 6,110,508, “R2”)

Claims 7 and 16 were rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Klingenberg et al. (R1) in view of Terada et al. (US 5,124,261, “R3”) and Chernoglazov et al. (RU 2,177,79, “R4”).

Claims 5, 23, 24, 26, 28 and 29 were rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Klingenberg et al (R1) in view of Stetter (US 5,714,373, “R5”).

In order for a claim to be rendered obvious, each element of the claim must be disclosed within the cited references. Present claim 1 as amended recites:

A method for the prevention or retarding of staling during the baking process of bakery products which comprises the step of adding an amount of at least one intermediate thermostable and/or thermostable serine protease to a dough prior to baking, wherein said serine protease has a temperature activity optimum higher than 60°C, wherein said thermostable serine protease further has a ratio between the activity at optimum temperature and the activity at 25°C higher than 10, wherein said amount is effective to prevent or retard staling in said bakery products and has no perceivable effect on dough rheology

Neither R1 nor R2 teaches or suggests the following features recited in present claim 1:

- the antistaling effect of thermostable serine proteases, and the addition of an amount of protease which prevents or retards staling of a bakery product
- the optimum temperature of the thermostable serine proteases higher than 60°C,

**Application No.: 10/510,401**  
**Filing Date: May 12, 2005**

- the ratio between the activity at optimal temperature and the activity at 25°C is higher than 10;
- lack of perceivable action of protease on dough rheology (i.e. before the baking process).

In the Office Action at page 8, the Examiner alleges that the recitation of an activity ratio at two different temperatures as recited in present claim 1 does not add anything new to the claim. However, this ratio between the protease activity at optimal temperature and the activity at 25° is a technical feature, which results from using highly purified protease and which provides an anti-staling effect without affecting the dough rheology. In addition, whether one single thermostable serine protease, or a mixture of several proteases is used, a ratio higher than 10 corresponds to a high degree of purity.

As previously noted, the composition described in R1 is crude, and may not necessarily possess the characteristics of the proteases recited in the presently pending claims. Furthermore, there is no teaching or suggestion in R1 of using a sufficient amount of the protease to prevent or retard staling while having no perceivable action on dough rheology as presently claimed. In fact, it is unknown what the effects of adding the crude preparations of R1 to dough would be. Accordingly, R1 does not provide a reasonable expectation that the compositions described therein would be able to prevent or retard staling while having no perceivable action on dough rheology.

As discussed in Applicants' previous response, other proteases (e.g., papain and thermolysin) do not exhibit anti-staling effects (PCT publication at paragraph 27. As noted in Applicants' previous response, papain, which is a thermostable cysteine protease, does not reduce bread staling without adversely affecting the crumb. Thus, papain would not be suitable for use in baking. In the Office Action at page 11, the Examiner responds by stating that "mesophilic enzymes such as papain, when used indiscriminately, would show the effect at ambient temperature while the thermophilic enzymes would show the effect when the temperature of the environment, e.g. oven is raised...Therefore, at optimal levels, proteolytic enzymes can be used to retard staling." The Examiner provides no support for his contention that papain can retard staling without adversely affecting the crumb structure, which is contrary to the statements in the Rule 132 Declaration submitted previously. Applicants note that the statements of experts as

**Application No.: 10/510,401**  
**Filing Date: May 12, 2005**

recited in such a declaration must be taken at face value unless the Examiner can provide evidence to the contrary. Thus, without providing the basis for his position, which contradicts the statements in the Rule 132 Declaration, the Examiner cannot support a *prima facie* assertion of obviousness.

The Examiner quotes Gray et al. (2003) in support of his statement that “[i]nclusion of proteases in bread dough as an antistaling agent has been known in the art for many years. However, this reference was published after the priority date (April 5, 2002) of the present application, and is therefore not prior art. Nevertheless, it is interesting to note that after the present invention was made, the staling phenomenon had still not been elucidated.

At page 8 of the Office Action, the Examiner states that:

“Van Eijk and Hille (1996) concluded that, while the addition of excess concentrations of proteolytic enzymes would certainly be detrimental to the bread loaf, adding optimal levels of proteases to breads **might** increase their shelf life.”

However, the Examiner has neglected to include the next sentence from this reference:

“**If so**, the presence of contaminant levels of proteases in commercial  $\alpha$ -amylase preparations **might partially** explain the currently unresolved mechanism of antistaling (Gray and BeMiller 2001).”

Thus, the Examiner has taken a passage out of context in order to support his allegation that proteases extend the shelf life of bakery products. However, this reference is quite speculative on the anti-staling effect of proteases added to bakery process, and provides no evidence that this actually occurs. Referring to the same passage, if not considered in its context, one would have the impression that anti-staling properties of alpha amylases were in fact due to contamination by proteases. However, it is well known that alpha amylases exhibit antistaling properties.

In view of the complex phenomena described in this reference, it cannot be concluded from R1, which only mentions gluten breakdown, that it would be obvious that thermitase or another thermostable serine protease would have an antistaling effect. As noted above, R1 neither discloses nor suggests using thermitase in a baking process.

**Application No.: 10/510,401**  
**Filing Date: May 12, 2005**

Although thermolysin (a thermostable metalloproteinase) would also effectively break down gluten, it is inefficient as an anti-staling agent (PCT publication at paragraph 27). The crude preparation or the partially purified form of the enzyme for the food industry disclosed in R1 was never intended to be used in purified form for food, as explicitly mentioned in the section entitled “scope of the invention.” Therefore, based on R1, the skilled person will not use a thermostable serine protease as an antistaling agent, and would not use such enzymes in purified form for meeting the ratio requirement of present claim 1.

Although R3 discloses aqualysin 1, this reference neither teaches nor suggests that this enzyme can be used in baking processes, or more generally in food industry. Thus, with respect to new claims 33 and 34, applicants submit that there is no teaching or suggestion in the cited references to use aqualysin to prevent or retard staling. Similarly, R4 mentions the use of mutated keratinase in the food industry, with no indication on its purpose or technical effect, and does not mention it use in baking processes. Moreover, in R4, the keratinase is obtained after random mutagenesis (UV and/or chemical mutagens) and the selection is said to be based on the property of hyperactivity. Consequently, even if the keratinase of R4 was originally thermostable, it may have lost this property after the random mutagenesis. It should be noted that “keratinase” is a generic name (able to digest keratin) and does not correspond to a specific peptide or protein sequence. Moreover, not all keratinases are thermostable serine proteases. R5 simply discloses isolation and identification of a thermostable serine protease from *Thermococcus* which has an optimum temperature range between 60°C and 90°C, but neither discloses nor suggests its use as an anti-staling agent in baking processes.

Thus, there is no teaching or suggestion in any of the cited references that serine proteases having the recited properties can prevent or retard staling while having no perceivable effect on dough rheology, nor is there any teaching or suggestion of using the serine protease in a sufficient amount to achieve these results.

In view of the comments presented above, Applicants respectfully request reconsideration and withdrawal of the rejections under 35 U.S.C. § 103(a)

**Application No.: 10/510,401**  
**Filing Date: May 12, 2005**

No Disclaimers or Disavowals

Although the present communication may include alterations to the application or claims, or characterizations of claim scope or referenced art, the Applicants are not conceding in this application that previously pending claims are not patentable over the cited references. Rather, any alterations or characterizations are being made to facilitate expeditious prosecution of this application. The Applicants reserve the right to pursue at a later date any previously pending or other broader or narrower claims that capture any subject matter supported by the present disclosure, including subject matter found to be specifically disclaimed herein or by any prior prosecution. Accordingly, reviewers of this or any parent, child or related prosecution history shall not reasonably infer that the Applicants have made any disclaimers or disavowals of any subject matter supported by the present application.

**CONCLUSION**

Applicants have endeavored to address all of the Examiner's concerns as expressed in the outstanding Office Action. Accordingly, amendments to the claims, the reasons therefor, and arguments in support of the patentability of the pending claim set are presented above. In light of the above amendments and remarks, reconsideration and withdrawal of the outstanding rejections is specifically requested. If the Examiner finds any remaining impediment to the prompt allowance of these claims that could be clarified with a telephone conference, the Examiner is respectfully requested to initiate the same with the undersigned.

**Application No.: 10/510,401**  
**Filing Date: May 12, 2005**

Please charge any additional fees, including any fees for additional extension of time, or credit overpayment to Deposit Account No. 11-1410.

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: October 25, 2010

By:/Neil S. Bartfeld/  
Neil S. Bartfeld, Ph.D.  
Registration No. 39,901  
Agent of Record  
Customer No. 20,995  
(858) 836-9000

9883929  
102110